

What is claimed is:

1 1. An electrode used for a discharge lamp, comprising:
2 an electrode rod made of refractory metal; and
3 a winding element made of refractory metal wires
4 that are wound around the electrode rod in a same turning
5 direction and that forms n layers of coils, n being larger
6 than one,

7 wherein a wire forming an $(m+1)$ th layer is wound
8 along a spiral valley between adjacent turns in a coil of an
9 m th layer, m satisfying an inequality $0 < m < n$, an ordinal
10 number given to each layer representing an order in which a
11 coil of the layer has been formed.

2. The electrode of Claim 1,
wherein the wire forming the $(m+1)$ th layer is wound
to cover the spiral valley.

3. The electrode of Claim 2,
wherein all the refractory metal wires have a same
diameter.

4. The electrode of Claim 1,
wherein at a discharge end of the winding element,
the winding element is cut along a plane approximately
perpendicular to a longitudinal direction of the electrode
rod.

1 5. The electrode of Claim 4, 5
f.

2 wherein each layer in the winding element contains
3 an equal number of turns.

1 6. The electrode of Claim 1,

2 wherein at an opposite end to a discharge end of the
3 winding element, the winding element is cut along a plane
4 approximately perpendicular to a longitudinal direction of
5 the electrode rod.

1 7. The electrode of Claim 6,

2 wherein at the opposite end, the winding element is
3 fixed to the electrode rod.

1 8. The electrode of Claim 1,

2 wherein a refractory metal wire forming a first
3 layer has a smaller diameter than a refractory metal wire
4 forming a second layer and

5 wherein the refractory metal wire forming the second
6 layer is wound to form spaces that are each surrounded by
7 (a) adjacent turns in a coil of the first layer, (b) the
8 electrode rod, and (c) the second layer.

1 9. The electrode of Claim 1,

2 wherein the n layers include a $(p-1)$ th layer, a p th
3 layer, and $(p+1)$ th layer, which are formed by refractory
4 metal wires with diameters of $P-1$, P , and $P+1$ respectively,

5 p satisfying an inequality $1 < p < n$, inequalities $P < P-1$ and $\frac{P}{F}$
6 $P < P+1$ being satisfied, and

7 wherein the three refractory metal wires are wound
8 to form spaces that are each surrounded by (a) the $(p-1)$ th
9 layer (b) adjacent turns in a coil of the p th layer, and (c)
10 the $(p+1)$ th layer.

1 10. The electrode of Claim 1,

2 wherein a refractory metal wire forming an n th layer
3 has a smaller diameter than a refractory metal wire forming
4 an $(n-1)$ th layer.

5 11. The electrode of Claim 1,

6 wherein at least refractory metal wires forming
7 layers from a first layer to an $(n-1)$ th layer have
8 approximately circular cross-sectional shapes.

9 12. The electrode of Claim 1,

10 wherein a major constituent of the electrode rod and
11 each refractory metal wire is tungsten.

1 13. A discharge lamp, comprising:

2 two electrodes; and

3 a light-emitting tube that includes (a) a light-
4 emitting part containing a light-emitting space and (b) two
5 sealing parts that each seal a different end of the light-
6 emitting part, wherein the two electrodes extend from the

7 two sealing parts,

8 wherein the two electrodes each include:

9 an electrode rod made of refractory metal; and

10 a winding element made of refractory metal wires
11 that are wound around the electrode rod in a same turning
12 direction and that forms n layers of coils, n being larger
13 than one,

14 wherein a wire forming an $(m+1)$ th layer is wound
15 along a spiral valley between adjacent turns in a coil of an
16 m th layer, m satisfying an inequality $0 < m < n$, an ordinal
17 number given to each layer representing an order in which a
18 coil of the layer has been formed.

14. The discharge lamp of Claim 13,

wherein a length from a tip of one electrode to a
tip of another electrode is 2.5 mm or shorter.

15. The discharge lamp of Claim 14,

wherein the length is 0.6 mm or longer.

16. A method for producing an electrode used for a
discharge lamp, including:

a winding step for winding at least one refractory
metal wire around a core member and forming n layers of
coils one by one, n being larger than one;

a cutting step for cutting the formed n layers of
coils and the core member;

8 a removing step for removing the core member after
9 the cutting step;

10 a rod inserting step for inserting an electrode rod
11 into a space from which the core member has been removed,
12 the electrode rod being made of refractory metal; and

13 a fixing step for fixing the formed n layers of
14 coils to the inserted electrode rod.

1 17. The method of Claim 16,

2 wherein in the winding step, a refractory metal wire
3 forming an $(m+1)$ th layer is wound along a spiral valley
4 between adjacent turns in a coil of an m th layer, m
5 satisfying an inequality $0 < m < n$, an ordinal number given to
6 each layer representing order in which a coil of the layer
7 has been formed and

8 wherein refractory metal wires forming the $(m+1)$ th
9 layer and the m th layer are wound in a same turning
10 direction.

1 18. The method of Claim 16, further including

2 a shape stabilizing step for stabilizing a shape of
3 the n number of layers of coils, wherein the shape
4 stabilizing step is performed between the winding step and
5 the cutting step.

1 19. The method of Claim 16,

2 wherein the removing step is performed by immersing

3 the core member, around which the n number of layers have
4 been formed, into a liquid that dissolves the core member
5 but does not dissolve each refractory metal wire.

1 20. The method of Claim 19,
2 wherein the core member is made of molybdenum, and
3 each refractory metal wire is made of tungsten.

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